

***DOLICHOVESPULA* (HYMENOPTERA: VESPIDAE),
HOSTS OF *APHOMIA SOCIELLA* (L.)
(LEPIDOPTERA: PYRALIDAE)**

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Abstract.—Caterpillars of the moth *Aphomia sociella* (L.) were collected from active colonies of *Dolichovespula arenaria* (F) and *D. maculata* (L.), the first documented new world hosts for this nest inquiline. Caterpillars held indoors were successfully reared to adults. Emergences coincided with typical flight period ranges in nature, overlapping the early phases of vespine colony development.

The bumble bee wax moth *Aphomia sociella* (L.) is an inquiline of bumble bee and vespine wasp colonies. It is widely distributed in Europe, where its life cycle, habits, and host range have been described (Sladen, 1912; Beirne, 1952; Kemper and Dohring, 1967; Pouvreau, 1967; Alford, 1975). Larvae developing within the host nest may consume nest materials, stored food, meconia and other wastes, and immature stages of the host insect. The silken webbing, tunnels, and cocoons spun by *A. sociella* caterpillars are dense and difficult to penetrate. Heavy infestations at vespine colonies can destroy large areas of comb (Fig. 1)

In North America, published reports refer only to the distribution of adults (Forbes, 1923), and specific host records are lacking. In the present study I document the occurrence of *A. sociella* caterpillars in active colonies of two *Dolichovespula* Rohwer species, and offer additional notes on its habits and distribution.

MATERIALS AND METHODS

Nests of potential vespine hosts of *A. sociella* from two regions of North America were examined. From 1984–1988, 131 nests were collected from Alameda, Contra Costa, and San Francisco Counties, California. From 1992–1994, 108 nests were collected from Dutchess, Putnam, and Westchester Counties, New York, and Fairfield County, Connecticut. Each nest was removed from its natural setting, its envelope stripped, and combs separated to search for *A. sociella* caterpillars or webbing. Five infested nests were held in clear plastic containers for up to two weeks to allow adult wasps to eclose. Caterpillars and the associated matrix of webbing and nest materials were then transferred to cardboard cans (i.e., not exposed to light) and held indoors at approximately 10°C to rear adults moths.

The area around an incandescant night light at Brewster (Putnam County), New York was inspected for alighted adults during evenings from April to November in 1992–1994. Adult specimens in the collections of The American Museum of Natural History and Cornell University were examined for additional distributional and phenological data.

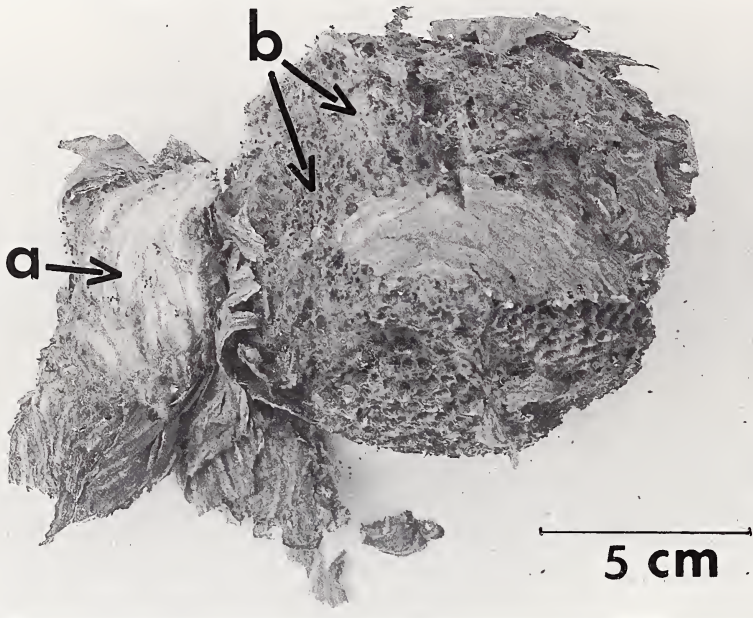


Fig. 1. *Dolichovespula arenaria* nest dissected by *Aphomia sociella* caterpillars. Nest envelope has been removed to show interior: a—mass of *A. sociella* coccons; b—upper combs engulfed in matrix of silk webbing; small dark spots scattered throughout are caterpillar feces.

RESULTS AND DISCUSSION

No *A. sociella* were detected in California, a finding corroborated by previous surveys of Pyralidae in that state (J. Powell, pers. comm.). In the east, one adult female was collected at Brewster on 25 June 1993. *A. sociella* caterpillars were found only in nests of *Dolichovespula arenaria* (F) and *D. maculata* (L.) (Table 1), rep-

Table 1. Colonies of Vespinae examined for *A. sociella*.

	Number examined	Number infested
California (1983–1987)		
<i>Dolichovespula arenaria</i>	65	0
<i>Vespula pensylvanica</i>	36	0
<i>Vespula vulgaris</i>	30	0
New York/Connecticut (1992–1994)		
<i>Dolichovespula arenaria</i>	44	6
<i>Dolichovespula maculata</i>	59	3
<i>Vespula flavopilosa</i>	3	0
<i>Vespula maculifrons</i>	2	0

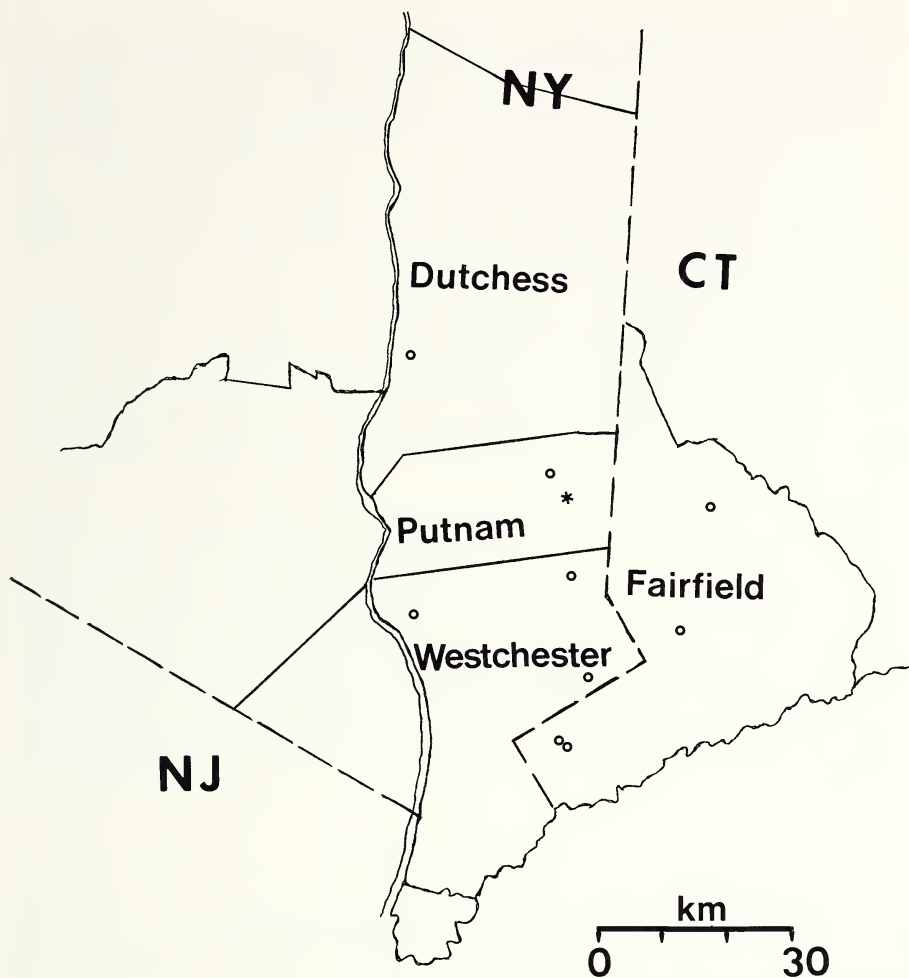


Fig. 2. Collection localities for *Aphomia sociella*; open circles represent infested *Dolichovespula* colonies; asterisk represents adult moth.

representing the first new world host records as well as new distribution records for New York State (Fig. 2). Data are inconclusive regarding *Vespula* Thomson spp. as hosts, due to the small sample size from New York and Connecticut.

In Europe it is unusual for *A. sociella* to occur in subterranean *Bombus* nests (Beirne, 1952; Alford, 1975). This pattern, if extended to *A. sociella*'s selection among potential vespine hosts, would lead to specialization on *Dolichovespula*, which typically build exposed aerial nests, rather than *Vespula*, whose nests are typically subterranean or concealed (Akre et al., 1980).

Patterns of comb damage and silken webbing suggested that caterpillars were initially present in the topmost combs of infested nests. *A. sociella* is not an obligate

entomophage (Schousboe, 1980), and hosts may escape harm if contact with caterpillars is avoided. Coexistence within the nest may be accomplished if the infestation is light or occurs late in the colony cycle, since vespine wasps expand the nest downward by adding combs to the bottom, essentially abandoning the upper combs for rearing purposes after the cells have been used several times (Akre et al., 1980). Even heavy caterpillar infestations may cause little harm if vigorous colony growth has produced a nest large enough to accommodate both species. None of the infested *D. maculata* colonies, including one supporting a heavy caterpillar load, suffered apparent damage from the presence of the inquiline. In contrast, most of the *D. arenaria* colonies containing *A. sociella* caterpillars were in a weakened condition, as evidenced by invasion of active combs, low worker populations, or overall deterioration of the nest prior to the construction of large (reproductive) cells (Fig. 1). However, the role of *A. sociella* in *D. arenaria* colony failure is not clear, as colonies of this species may be weakened early in the colony cycle by invasion by the social parasite *D. arctica* (Rohwer) or usurpation struggles with other vespine queens (Greene, 1991), thus predisposing them to both premature decline and invasion by *A. sociella*.

Fragments of all nests held indoors yielded adults. In 1992–1993 (one nest) emergence was in March and April; in 1993–1994 (four nests) emergence was from April to early July. Although the developmental rates for insects held indoors were likely to differ from those experiencing natural climate conditions, the emergence of moths from the experimental nests was consistent with flight period ranges observed in the northeastern United States, coinciding with the early phases of *Bombus* and vespine colony development. Since the defenses of host colonies become more vigorous as worker populations increase during the summer, *A. sociella*'s early presence affords it an opportunity to enter and oviposit at nests while they are relatively poorly defended.

ACKNOWLEDGMENTS

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